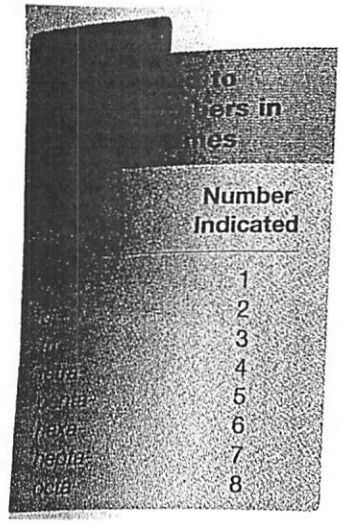
Naming Binary Compounds That Contain Only Nonmetals (Type III)

Objective: *To learn how to name binary compounds containing only nonmetals.*



Binary compounds that contain only nonmetals are named in accordance with a system similar in some ways to the rules for naming binary ionic compounds, but there are important differences. *Type III binary compounds contain only nonmetals.* The following rules cover the naming of these compounds.

Rules for Naming Type III Binary Compounds

1. The first element in the formula is named first, and the full element name is used.
2. The second element is named as though it were an anion.
3. Prefixes are used to denote the numbers of atoms present. These prefixes are given in **Table 4.3.**
4. The prefix *mono-* is never used for naming the first element. For example, CO is called carbon monoxide, *not* monocarbon monoxide.

CHEMISTRY

Water and ammonia are always referred to by their common names.

Naming Type III Binary Compounds

Name the following binary compounds, which contain two nonmetals (Type III).

a. BF_3 **b.** NO **c.** N_2O_5

Solution

a. BF_3

Rule 1 Name the first element, using the full element name: boron.

Rule 2 Name the second element as though it were an anion: fluoride.

Rules 3 and 4 Use prefixes to denote numbers of atoms. One boron atom: do not use *mono-* in first position. Three fluorine atoms: use the prefix *tri-*.

The name of BF_3 is boron trifluoride.

b.

Compound	*Individual Names*	*Prefixes*	*Comments*
NO	nitrogen oxide	none *mono-*	*Mono-* is not used for the first element.

The name for NO is nitrogen monoxide. Note that the second *o* in *mono-* has been dropped for easier pronunciation. The *common* name for NO, which is often used by chemists, is nitric oxide.

c.

Compound	*Individual Names*	*Prefixes*	*Comments*
N_2O_5	nitrogen oxide	*di-* *penta-*	two N atoms five O atoms

The name for N_2O_5 is dinitrogen pentoxide. The *a* in *penta-* has been dropped for easier pronunciation.

The previous examples illustrate that, to avoid awkward pronunciation, we often drop the final *o* or *a* of the prefix when the second element is oxygen. For example, N_2O_4 is called dinitrogen tetroxide, *not* dinitrogen tetraoxide, and CO is called carbon monoxide, *not* carbon monooxide.

Some compounds are always referred to by their common names. The two best examples are water and ammonia. The systematic names for H_2O and NH_3 are never used.

Naming Type III Binary Compounds: Summary

Name each of the following compounds.

a. PCl_5 **c.** SF_6 **e.** SO_2
b. P_4O_6 **d.** SO_3 **f.** N_2O_3

Self-Check Exercise 4.3

Name the following compounds.

a. CCl_4 **b.** NO_2 **c.** IF_5

Self-Check Exercise 4.4

Name the following compounds.

a. SiO_2
b. O_2F_2
c. XeF_6